

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Hokkanen Serial No.: UNKNOWN
Filed: CONCURRENT HERewith Docket No.: 975.365USW1
Title: METHOD AND DEVICE FOR PERFORMING HANDOVER USING
LOCATION INFORMATION

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The undersigned hereby certifies that this Transmittal Letter and the paper or fee, as described herein, are being deposited with the United States Postal Service 'Express Mail Post Office To Addressee' service under 37 CFR 1.10 and is addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231

By:

Kari Arnold

PRELIMINARY AMENDMENT

Box Patent Application
Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

Please enter the following preliminary amendment into the above-referenced application.

ABSTRACT

Please insert the attached abstract into the application as the last page thereof.

SPECIFICATION

Please amend the specification as follows:

Delete specification pages 3-5, substituting replacement pages 3-5a attached.

CLAIMS

Please cancel claims 1-26. Please enter new claims as listed below:

27. (New) A method for performing a handover procedure for

a mobile station (**MS**) communicating in a communication network and being movable therein,

said communication network comprising

a plurality of base transceiver stations being adapted to perform a communication with said mobile station (**MS**) within its coverage area,

said method comprising the steps of

processing (**S3**) location information related to the mobile station (**MS**) by comparing it with position information related to the base transceiver stations (**BTS 1A, BTS 1B, BTS 2, BTS 3**),

deciding (**S4**) on the basis of the result of said processing (**S3**), whether a first handover condition is fulfilled, and checking subscriber specifications concerning another measurement (**S5**) for a handover,

designating (**S9**) a next base transceiver station in said communication network, to which the communication with said mobile station (**MS**) is to be directed from a current base transceiver station, when the first handover condition is fulfilled,

triggering a handover (**S10**) of the communication connection of the mobile station (**MS**) from the current base transceiver station to the next base transceiver station designated in said designating step (**S10**), and

performing (**S11**) the handover.

28. (New) A method according to claim 27, wherein

in said processing step (**S3**) at least one additional parameter is processed together with said location information related to the mobile station (**MS**) and position information related to the base transceiver stations (**BTS 1A, BTS 1B, BTS 2, BTS 3**).

29. (New) A method according to claim 28, wherein

said additional parameter is based on a signal quality.

30. (New) A method according to claim 27, further comprising a location information obtaining step (**S2**) comprising

a step of determining said location information related to the mobile station (**MS**) and

a step of transmitting said determined location information to a respective network device (**BSC, MSC**) adapted to perform said processing step (**S3**).

31. (New) A method according to claim 30, wherein said step of determining said location information related to the mobile station (**MS**) is executed in the mobile station (**MS**).

32. (New) A method according to claim 30, wherein said step of determining said location information related to the mobile station (**MS**) is executed in a network element on the network infrastructure side.

33. (New) A method according to claim 30, wherein said step of determining said location information related to the mobile station (**MS**) is based on at least one of the following methods:

- locating by a global positioning system;
- locating by a time of arrival;
- locating by an observed time difference.

34. (New) A method according to claim 30, wherein said location information obtaining step (**S2**) is executed periodically.

35. (New) A method according to claim 30, wherein said location obtaining step (**S2**) is executed upon predetermined occasions.

36. (New) A method according to claim 35, wherein said predetermined occasion is a attachment procedure of the mobile station (**MS**) to the communication network.

37. (New) A method according to claim 27, wherein,
if the first handover condition is not fulfilled, on the basis of the checking of the subscriber specifications,
the method **further comprises the steps of**
checking (**S5**), whether a further measurement is to be performed,
selecting (**S6**) a type of further measurement, if a measurement is to be performed,
executing (**S7**) the measurement selected in said selecting step (**S6**),

verifying (**S8**), whether a measurement result represents a second handover condition, and

if the result of said verifying step (**S8**) represents the second handover condition, initiating execution of said target cell designation step (**S9**) for performing the handover (**S10, S11**).

38. (New) A method according to claim 27, wherein the coverage area of the base transceiver station designated in said designating step (**S9**) and to which the communication connection is to be directed (**S10**) is a coverage area adjacent to the coverage area of the current base transceiver station.

39. (New) A method according to claim 27, wherein the coverage area of the base transceiver station designated in said designating step (**S9**) and to which the communication connection is to be directed (**S10**) is a coverage area not adjacent to the coverage area of the current base transceiver station.

40. (New) A method according to claim 39, wherein the coverage area not adjacent to the coverage area of the current base transceiver station to which the communication connection is to be directed (**S10**) is known to the communication network.

41. (New) A method according to claim 40, wherein the base transceiver station (**BTS**) with the coverage area not adjacent to the coverage area of the current base transceiver station, to which the communication connection is to be directed (**S10**), is a predetermined base transceiver station (**BTS**).

42. (New) A method according to claim 41, wherein the position information of the predetermined base transceiver station (**BTS**) is stored in a subscriber identity module (**SIM**) or in the mobile station (**MS**).

43. (New) A device for controlling a handover procedure for
a mobile station (**MS**) communicating in a communication network and being movable therein,
said communication network comprising

a plurality of base transceiver stations being adapted to perform a communication with said mobile station (**MS**) within its coverage area,
said device comprising

a processing means (**2**) for processing location information related to said mobile station (**MS**) by comparing it with position information related to base transceiver stations (**BTS**), and for deciding on the basis of the result of said processing, whether a first handover condition is fulfilled, and for checking subscriber specifications concerning another measurement for a handover,

a designating means (**4**) for designating a next base transceiver station in said communication network, to which the communication with said mobile station (**MS**) is to be switched from a current base transceiver station, when the first handover condition is fulfilled, and

a triggering means (**5**) for triggering a handover of the communication connection of the mobile station (**MS**) from the current base transceiver station to the next base transceiver station designated by said designating means (**4**).

44. (New) A device according to claim 43, wherein
in said processing means (**2**) at least one additional parameter is processed together with said location information related to the mobile station (**MS**) and position information related to the base transceiver stations (**BTS 1A, BTS 1B, BTS 2, BTS 3**).

45. (New) A device according to claim 44, wherein
said additional parameter is based on a signal quality.

46. (New) A device according to claim 43, further comprising means (**1**)
for determining location information related to the mobile station (**MS**) and
for transmitting said determined location information to a respective network device (**BSC, MSC**) performing said processing.

47. (New) A device according to claim 46, further comprising a memory means (**3**)
for memorizing location information related to the mobile station (**MS**) and position information related to the base transceiver stations (**BTS**),

48. (New) A device according to claim 46, wherein said means (1) for determining location information related to the mobile station (**MS**) and for transmitting said determined location information to a respective network device (**BSC, MSC**) performing said processing are located in the mobile station (**MS**).

49. (New) A device according to claim 46, wherein said means (1) for determining location information related to the mobile station (**MS**) and for transmitting said determined location information to a respective network device (**BSC, MSC**) performing said processing are located in a network element on the network infrastructure side.

50. (New) A device according to claim 46, wherein said means (1) for determining the location information related to the mobile station (**MS**) is adapted to perform said determination according to at least one of the following methods:

- locating by a global positioning system;
- locating by a time of arrival;
- locating by an observed time difference.

51. (New) A device according to claim 43, further comprising a measurement means (6) being responsive to the subscriber specifications and adapted to
check, whether a further measurement is to be performed,
select a type of further measurement, if a measurement is to be performed,
execute the selected measurement,
verify, whether a measurement result represents a second handover condition,
and
if said second handover condition is verified, forwarding the measurement result to said handover condition processing means (2) for performing the handover.

REMARKS

The above preliminary amendment is made to insert an abstract page into the application, amend the specification and to enter new claims 27-51

Applicant respectfully requests that this preliminary amendment be entered into the record prior to calculation of the filing fee and prior to examination and consideration of the above-identified application.

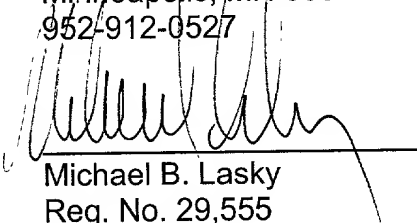
If a telephone conference would be helpful in resolving any issues concerning this communication, please contact Applicant's attorney of record, Michael B. Lasky at 952-912-0527.

Respectfully submitted,

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Date: October 17, 2001

By:


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- Replacement 3 -

timeslot of a TDMA frame. Said BCCH can be compared with a radio beacon of the base transceiver station, wherein via said BCCH the first contact between the mobile station and the base transceiver station is established. The BCCH is
5 also used to inform the mobile station about access parameters and the like and to enable a position determination.

On the other hand, a handover can also be required in the
10 case, that there is too much traffic in the corresponding cell. Each cell has a limited number of traffic channels (TCH) used for data exchange or speech transmission. If a subscriber wants to make a call but no more TCH is available because of too many currently active calls, a
15 handover is performed to another cell with an available TCH, even if measurement of, e.g., signal strength results in a lower value for this new cell.

It is to be noted, that a handover procedure can be
20 executed during a call setup phase and during an active call.

However, as only a limited number of channels is available, a permanent transmission of a channel like said BCCH is
25 wasteful in terms of the radio communication resources of the communication network.

Additionally, each of the base transceiver stations of the communication network has permanently to be turned on to
30 transmit said BCCH, even if there is no mobile station present within its coverage area. This results in an unnecessary power waste.

Document US 5,546,445 describes a method and a system in
35 which both a position controlled system and a signal strength system are included in a cellular system, a mobile

telecommunications switching office can include a software system in a memory to use the position controlled system, but to also test signal strength, and to use a signal strength controlled system if a signal still falls below a
5 predetermined value when making call management decisions based on the position of a mobile unit.

Document WO 99/07167 concerns a geographical restriction in a cellular telecommunication network. There is disclosed a
10 method for performing a handover in which tariff related information are taken into consideration.

Document WO 93/19560 describes a method for performing a handover in which a serving base transceiver stations seeks
15 base transceiver stations for a handover which are not adjacent to the serving base transceiver station.

Document DE 197 41 701 A1 describes a method and a device for a handover of a mobile station in a mobile radio
20 system. A base station is connected to a radio positioning system and receives positioning signals. Coordinates of a mobile station are calculated on the basis of the coordinates of the base stations communicating with the mobile station and a distance between the mobile station
25 and the base stations.

SUMMARY OF THE INVENTION

Therefore, it is an object of the present invention to
30 provide an improved method which enables to perform a handover procedure while maintaining a better use of available radio resources, and to provide a correspondingly improved device for performing said handover procedure.

35 According to the present invention, this object is achieved by a method for performing a handover procedure for a

mobile station communicating in a communication network and being movable therein, said communication network comprising a plurality of base transceiver stations being adapted to perform a communication with said mobile station within its coverage area, said method comprising the steps of processing location information related to the mobile station by comparing it with position information related to the base transceiver stations, deciding on the basis of the result of said processing, whether a first handover condition is fulfilled, and checking subscriber specifications concerning another measurement for a handover, designating a next base transceiver station in said communication network, to which the communication with said mobile station is to be directed from a current base transceiver station, when the first handover condition is fulfilled, triggering a handover of the communication connection of the mobile station from the current base transceiver station to the next base transceiver station designated in said designating step, and performing the handover.

Furthermore, the present invention proposes a device for controlling a handover procedure for a mobile station communicating in a communication network and being movable therein, said communication network comprising a plurality of base transceiver stations being adapted to perform a communication with said mobile station within its coverage area, said device comprising a processing means for processing location information related to said mobile station by comparing it with position information related to base transceiver stations, and for deciding on the basis of the result of said processing, whether a first handover condition is fulfilled, and for checking subscriber specifications concerning another measurement for a handover, a designating means for designating a next base transceiver station in said communication network, to which

- Replacement 5a -

the communication with said mobile station is to be switched from a current base transceiver station, when the first handover condition is fulfilled, and a triggering means for triggering a handover of the communication

- 5 connection of the mobile station from the current base transceiver station to the next base transceiver station designated by said designating means.

- Advantageous further developments of the present invention
10 are as set out in the respective dependent claims.

- According to the present invention, the proposed method and/or device use location information which is, for example, periodically determined to decide whether a
15 handover is to be performed and to which base transceiver station the communication connection is to be changed. This allows the usage of base transceiver stations which do not transmit a broadcast control channel, since the handover is initiated by the corresponding network device, e.g., the
20 base station controller BSC. This decreases the system interference level and increases the network capacity by reducing channels not directly used for communication.

- Furthermore, base transceiver stations can be used which
25 can be turned off. Said base transceiver stations are only turned on by the corresponding base station controller when a mobile station is within the coverage area of said base transceiver stations. This saves costs and reduces power consumption.